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AUTHORS: Vanyukov, A. V., Utkin, N. I., Remov, V. A. SOV/32-25-2-47/78

TITLE: A High Temperature Laboratory Centrifuge (Vysokotemperaturnaya laboratornaya tsentrifuga)

PERIODICAL: Zavodskaya Laboratoriya, 1959, Vol 25, Nr 2, p 222 (USSR)

ABSTRACT: A centrifuge has been developed which permits a working temperature of 1400°. As may be seen from the figure (Fig) the centrifuge head turns in an electric stove. It is turned by a 0.52 kw electric motor. The speed may be adjusted to 500,700 and 900 r.p.m., the speed of the motor being 1400 r.p.m. At the upper end of the stove there are two openings. The thermoelements are introduced through one of the openings, while nitrogen containing no oxygen is supplied through the other. Molten slag was centrifuged in the following way: the slag was molten and then centrifuged. When the stove was switched off the centrifuge continued operation until the slag had cooled off and solidified. There is 1 figure.

ASSOCIATION: Moskovskiy institut tsvetnykh metallov i zolota im. M. I. Kalinina (Moscow Institute of Non-Ferrous Metals and Gold imeni M. I. Kalinin)

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SOV/149-60-1-10/27

AUTHORS: Vanyukov, A. V., Odinets, Z. K.

TITLE: Concerning Metal Distribution Between Matte and Slag

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Tsvetnaya metallurgiya, 1960, Nr 1, pp 73-83 (USSR)

ABSTRACT: The present work deals with distribution of Cu, Ni, Co in the state of equilibrium between matte and slag. Ideal law of mass action in systems consisting of slag, matte, and gas is not always valid; moreover, constants are variable depending on changes in phase composition. A slight increase in dissolved oxygen causes a greater solubility of metals. The matter is complicated by fine matte dispersions in the slag, which cannot be easily eliminated. An interesting method in this direction is high temperature centrifugation of slags. B. V. Lipin has made considerable contributions (Non-Ferrous Metals, Nr 9, 1957) to this procedure. However, perfect separation cannot be achieved in small crucibles at low speeds of 500-1,000 rpm. Therefore, the authors

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propose the use of radioactive $Au^{198}$ which is insoluble in slag; consequently its presence in the latter is only possible in the form of matte nuggets carrying this isotope. Using this tracer, the influence of slag, matte, and gas phase on Ni, Cu, and Co distribution among these phases was studied. The slag-matte interaction is of an electrochemical nature, and the distribution of metals between smelting products can be expressed by the equations

$$[Me] + (Fe^{2+}) \rightleftarrows (Me^{2+}) + [Fe]; \qquad (1)$$

$$[Me] - 2e \rightleftarrows (Me^{2+}); [S] + 2e \rightleftarrows (S^{2-}), \qquad (2)$$

where square brackets indicate the concentration in matte, while parenthesis indicates that in slag. In the calculation of dissociation constants it was assumed that the slag is in full state of ionic dissociation, and the cation part of iron or other metal being

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studied was considered. At the matte-slag interface sulfur and metal cross the boundary jointly while a cation exchange takes place between oxides. Matte is considered as an atomic solution, and the equation of the constant represents the atomic portions of iron and of other metal.

$$K_{Me} = \frac{(a_{MeO})\,[a_{Fe}]}{(a_{FeO})\,[a_{Me}]}. \qquad (3)$$

The distribution coefficients were calculated according to the ratio:

$$K_{p} = \frac{(\%Me)}{[\%Me]}. \qquad (4)$$

Calculation results are given by the authors in numerous tables with following comments and conclusions. The distribution of cobalt between slag and matte is basi-basically a cation exchange according to

$$[Co] + (Fe^{2+}) = [Fe] + (Co^{2+}),$$

the equilibrium of which in a neutral atmosphere follows in a satisfactory way the ideal law of acting masses. If cobalt were transferred into slag (as, for instance, during the nickel-matte refining) the temperature must be kept higher, as the value of the constant increases with higher temperatures. The distribution of copper is determined by the solubility of its sulfide. The copper content in the slag changes within the range of a few hundredths or tenths of a percent depending upon smelting conditions and components. The percentage of dissolved copper rises

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sharply with an increase of oxygen in the system, due to the weakening of the copper bond with the sulfide melt and the formation of iron micro-groups with variable valence containing sulfides. The greatest portion of nickel at the equilibrium point is located in the matte nuggets entangled in the silicate layer. The quantity of dissolved nickel does not exceed hundredths or even thousandths of one percent. A considerable quantity of dissolved nickel in actual plant slags is due to incomplete matte reactions and reversed slag oxidation in the tuyere area. A considerable portion of metal is lost because of mechanically entrained matte nuggets. A basiq measure to counteract these losses of Co, Ni, and Cu is to reduce the oxygen content in the system matte-slag-gas phase, and better smelting conditions (superheating, greater slag fluidity, increase in interface tension, longer settlement time, etc.). There are 5 tables; and 17 references, 13 Soviet, 3 German, 1 U.S. The U.S. reference is: A. M. Aksoy, S. D. Thesis, MIT, 1943.

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ASSOCIATION: Krasnoyarsk Institute of Nonferrous Metals. Chair of Metallurgy of Heavy Nonferrous Metals (Krasnoyarskiy institut tsvetnykh metallov. Kafedra metallurgi tyazhelykh tsvetnykh metallov)

SUBMITTED: June 30, 1959

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VANYUKOV, A.V.; ODINETS, Z.K.

Distribution of ferrous sulfide between matte and slag. Izv. vys. ucheb. zav.; tsvet. met. 3 no.4:45-48 '60. (MIRA 13:9)

1. Krasnoyarskiy institut tsvetnykh metallov. Kafedra metallurgii tyazhelykh tsvetnykh metallov.
(Nonferrous metals—Metallurgy) (Iron sulfide)

S/137/62/000/005/040/150
A006/A101

AUTHORS: Vanyukov, A. V., Utkin, N. I., Malevskiy, A. Yu., Popkov, A. N.

TITLE: Behavior of chromium in processing oxidized nickel ores

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 5, 1962, 22, abstract 5G139 ("Sb. nauchn. tr. In-t tsvetn. met. im. M. I. Kalinina", 1960, v. 33, 51 - 66)

TEXT: The authors studied behavior of Cr during melting of oxidized Ni ores and its effect upon the properties of slags. There are 24 references.

G. Svodtseva

[Abstracter's note: Complete translation]

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VANYUKOV, A. V. Doc Tech Sci -- "Refinement of ~~Perfecting the~~ methods of extract~~ion of~~ing nickel from oxidized ores." Mos, 1961 (Acad Sci USSR. Inst of Metallurgy im A. A. Baykov). (KL, 4-61, 193)

VANYUKOV, A.V.; POPKOV, A.N.

Studying surface properties and densities of metal sulfide and silicate melts. Izv. vys. ucheb. zav.; tsvet. met. 4 no.4:63-70 '61. (MIRA 14:8)

1. Krasnoyarskiy institut tsvetnykh metallov, kafedra metallurgi tyazhelykh tsvetnykh metallov.
(Surface tension) (Liquid metals)

POPKOV, A.N.; VANYUKOV, A.V.

Interphase tension on the boundary between matte and slag and the loss of metal with waste slags in the form of matte buttons. Izv. vys. ucheb. zav.; tsvet. met. 4 no.6:26-32 '61. (MIRA 14:12)

1. Krasnoyarskiy institut tsvetnykh metallov, kafedra metallurgii tyazhelykh tsvetnykh metallov.
(Nonferrous metals--Metallurgy)
(Surface tension)

VANYUKOV, A.V.; ZAYTSEV, V.Ya.

Studying densities, surface and interphase tensions in the system copper matte - silicate melt. Izv. vys. ucheb. zav.; tsvet. met. 5 no.4:80-85 '62. (MIRA 16:5)

1. Moskovskiy institut stali, kafedra metallurgii i fizicheskoy khimii tsvetnykh metallov.

(Liquid metals—Testing) (Surface chemistry)

VANYUKOV, A.V.; ZAYTSEV, V.Ya.

Coalescence of finely dispersed matte particles in silicate melts. Izv. vys. ucheb. zav.; tsvet. met. 5 no.5:39-47 '62. (MIRA 15:10)

1. Moskovskiy institut stali, kafedra metallurgii i fizicheskiy khimii tsvetnykh metallov.

(Nonferrous metals—Metallurgy)

SMIRNOV, A.S.; MALEVSKIY, A.Yu.; VANYUKOV, A.V.

Converting nickel-bearing copper mattes. TSvet. met. 35 no.1: 31-37 Ja '62. (MIRA 16:7)
(Copper--Metallurgy) (Nickel--Metallurgy)

SMIRNOV, A.S.; SINEV, L.A.; VANYUKOV, A.V.; POPKOV, A.N.

Reducing magnetite in converter slag for the purpose of depleting them of valuable metal. TSvet. met. 36 no.7:25-29 Jl '63. (MIRA 16:8)

(Slag--Analysis)

VANYUKOV, A.V. (Moskva); POPKOV, A.N. (Moskva); ZAYTSEV, V.Ia. (Moskva)

Determining the density and molar volume of silicate and metal sulfide melts. Izv. AN SSSR. Met. i gor. delo no.5:92-97 S-O '64. (MIRA 18:1)

ZAYTSEV, V.Ya.; VANYUKOV, A.V.; TAKEZHANOV, S.T.; DONCHENKO, P.A.;
UNZHAKOV, M.S.

Selecting the optimal slag composition for shaft furnace smelting of lead. TSvet. met. 38 no.6:23-28 Je '65.
(MIRA 18:10)

BYSTROV, V.P.; VANYUKOV, A.V.; ZAYTSEV, V. Ya.

Density and molar volume of copper and copper-lead matte.
Izv. vys. ucheb. zav.; tsvet. met. 7 no. 4:60-64 '64
(MIRA 19:1)

1. Moskovskiy institut stali i splavov, kafedra metallurgii i fizicheskoy khimii tsvetnykh metallov.

VANYUKOV, A.V.; TIKHONOV, S.S.; ZAYTSEV, V.Ya.

Studying the distribution of tin and lead between the products of smelting. TSvet.met. 38 no.10:29-32 O '65.

(MIRA 18:12)

ZAYTSEV, V. Ye.; VANYUKOV, A.V.; BYSTROV, V.P.

The wetting of a solid charge mixture with liquid sulfides and the effect of this factor on certain pyrometallurgical processes. TSvet. met. 38 no. 12:47-51 D '65 (MIRA 19:1)

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